

WHAT IS CLAIMED IS:

1. A punching device comprising:

a die member having a plurality of die holes  
formed therein;

5 a plurality of punch members which are caused to  
advance into the die holes to punch holes in a member  
to be punched;

an operating member having cam portions formed  
along a direction intersecting the direction of  
10 advancement of said punch members, said operating  
member being moved along the direction intersecting  
the direction of advancement of said punch members to  
cause by a conversion function of said cam portions  
said punch members to advance into the die holes; and  
15 drive means for selectively causing advancement  
of said plurality of punch members by changing the  
direction of movement of said operating member.

2. A punching device according to claim 1,  
20 wherein each of said cam portions has a straight  
groove and a cam groove for performing the conversion  
function, and wherein, when said operating member is  
moved in one of opposite directions, at least one of  
said cam grooves of said cam portions acts on one of  
25 said punch members to selectively cause the same to  
advance.

3. A punching device according to claim 2,  
wherein one of said cam portions has two cam grooves  
at its center, and straight grooves formed at  
opposite ends of each cam groove, and is used to  
5 control two of said punch members.

4. A punching device according to claim 2,  
wherein one of said cam portions has one cam groove  
at its center, and straight grooves formed at  
10 opposite ends of the cam groove, and is used to  
control two of said punch members.

5. A punching device according to claim 2,  
wherein one of said cam portions has one cam groove  
15 at its end, and a straight groove formed at an end of  
the cam groove, and is used to control one of said  
punch members.

6. A punching device according to claim 2,  
20 wherein:

one of said cam portions has two cam grooves at  
its center, and straight grooves formed at opposite  
ends of each cam groove, and is used to control two  
of said punch members;

25 another of said cam portions has one cam groove  
at its center, and straight grooves formed at  
opposite ends of the cam groove, and is used to

control two of said punch members; and

a remaining one of said cam portions has one cam groove at its end, and a straight groove formed at an end of the cam groove, and is used to control one of  
5 said punch members, two of said punch members and three of said punch members being selectively caused to advance.

7. A punching device according to claim 1,  
10 wherein:

the cam portions of said operating member are sectioned in the order of a first rest area, a first punching area, a second punching area, a second rest area, a third punching area, a fourth punching area,  
15 and a third rest area;

said operating member can be moved between the first rest area and the second rest area on the basis of a detection operation performed by means for detecting the position of said operating member under  
20 the control of operation control means for controlling said drive means; and

said operating member performs in the first punching area a punching operation for causing at least one of said punch members to advance into the  
25 corresponding die hole when moved from the first rest area to the second rest area, and performs in the second punching area a punching operation for causing

said at least one of the punch members to advance into the corresponding die hole when moved from the second rest area to the first rest area.

5           8. A punching device according to claim 7,  
wherein said operation control means performs an  
initializing operation for moving said operating  
member to the second rest area when said operating  
member is located in the first rest area or in the  
10 first punching area, and that for moving said  
operating member to the first rest area when said  
operating member is located in the second rest area  
or in the second punching area.

15           9. A punching device according to claim 1,  
wherein:

the cam portions of said operating member are  
sectioned in the order of a first rest area, a first  
punching area, a second punching area, a second rest  
20 area, a third punching area, a fourth punching area,  
and a third rest area;

said operating member is moved on the basis of a  
detection operation performed by means for detecting  
the position of said operating member under the  
25 control of operation control means for controlling  
said drive means;

said operating member punches a first number of

holes in the member to be punched with the  
corresponding number of said punch members when said  
operating member performs in the first punching area  
a punching operation for causing the corresponding  
5 number of said punch members to advance into the  
corresponding die holes during its movement from the  
first rest area to the second rest area, and when  
said operating member performs in the second punching  
area a punching operation for causing the  
10 corresponding number of said punch members to advance  
into the corresponding die holes during its movement  
from the second rest area to the first rest area; and  
said operating member punches a second number of  
holes in the member to be punched with the  
15 corresponding number of said punch members when said  
operating member performs in the third punching area  
a punching operation for causing the corresponding  
number of said punch members to advance into the  
corresponding die holes during its movement from the  
20 second rest area to the third rest area, and when  
said operating member performs in the fourth punching  
area a punching operation for causing the  
corresponding number of said punch members to advance  
into the corresponding die holes during its movement  
25 from the third rest area to the second rest area.

10. A punching device according to claim 9,

wherein said operation control means performs, on the basis of the detection operation of said position detection means, an initializing operation for moving said operating member to the second rest area when  
5 said operating member is located in the first rest area or in the first punching area, that for moving said operating member to the first rest area when said operating member is located in the second rest area or in the second punching area, that for moving  
10 said operating member to the third rest area when said operating member is located in the second rest area or in the third punching area, and that for moving said operating member to the second rest area when said operating member is located in the third  
15 rest area or in the fourth punching area.

11. A punching device according to claim 10, wherein a speed of the movement of said operating member in the initializing operation is lower than  
20 that in the punching operation.

12. A punching device according to claim 10, wherein said operation control means stops the operation of said drive means if said position  
25 detection means does not detect the movement of said operating member after a lapse of a predetermined period of time from the time at which said operation

control means starts the operation of said operating member.

13. A punching device according to claim 12,  
5 wherein the predetermined period of time in the case of the initializing operation is longer than that in the case of the punching operation.

14. A sheet processor comprising a punching  
10 device for punching holes in the sheet according to any one of claims 1 to 13.

15. An image forming apparatus comprising:  
image forming means for forming an image on a  
15 sheet; and

a punching device for punching holes in the sheet according to any one of claims 1 to 13.